

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Original) A frequency synthesizer comprising:
 - a fixed frequency generator configured to generate a fixed frequency signal;
 - a variable frequency generator configured to generate a variable frequency signal;
 - wherein the fixed frequency signal and the variable frequency signal are combined to provide a fast-hopping output signal.
2. (Original) A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator has an output that is not connected back to other components of the variable frequency generator.
3. (Original) A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator settles substantially faster than fixed frequency generator.
4. (Original) A frequency synthesizer as recited in Claim 1 further comprising a mixer configured to combine the fixed frequency signal and the variable frequency signal.
5. (Original) A frequency synthesizer as recited in Claim 1 wherein the frequency synthesizer is included in a transceiver.

6. (Original) A frequency synthesizer as recited in Claim 1 wherein the frequency synthesizer is used in an ultra-wide band (UWB) system.
7. (Original) A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes a signal generator and a fast switching component for configuring the signal generator.
8. (Original) A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes a signal generator and a fast switching component for operating on a plurality of generated signals by the signal generator.
9. (Original) A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes a direct digital synthesizer.
10. (Original) A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes a direct digital synthesizer comprising:
 - a digital to analog converter (DAC);
 - a parameter generator coupled to the DAC;
 - wherein the parameter generator is configured to provide a configuration parameter to the DAC, and the DAC is configured to generate the variable signal based on the configuration parameter.
11. (Original) A frequency synthesizer as recited in Claim 10 wherein the parameter generator includes a lookup table.
12. (Original) A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes an injection-locked synthesizer; and the fixed frequency signal is an input to the injection-locked synthesizer.

13. (Original) A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes an injection-locked synthesizer comprising:
 - a ring oscillator having a plurality of stages, where each of the plurality of stages has a stage output; and
 - a logic processor configured to perform operations on at least one of the stage outputs to obtain the variable frequency signal.
14. (Original) A frequency synthesizer as recited in Claim 13, wherein the logic processor is configured to perform an exclusive-or operation.
15. (Original) A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes a delay locked loop.
16. (Original) A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes:
 - a delay locked loop having a plurality of stages, wherein each of the plurality of stages has a stage output; and
 - a logic processor configured to perform an operation on at least one of the stage outputs to obtain the variable frequency signal.
17. (Withdrawn) A fast-hopping frequency synthesizer comprising:
 - a voltage controlled oscillator (VCO) configured to generate a fast-hopping output signal; and
 - a VCO controller coupled to the VCO for providing a first VCO configuration and a second VCO configuration;
 - wherein the VCO controller switches between the first VCO configuration and the second VCO configuration at a fast-hop switching speed.

18. (Withdrawn) A frequency synthesizer as recited in Claim 17 wherein the fast-hopping output signal is directly synthesized.
19. (Withdrawn) A frequency synthesizer as recited in Claim 17 wherein the VCO controller comprises a memory for storing a configuration used to determine a VCO input.
20. (Withdrawn) A frequency synthesizer as recited in Claim 17 further comprising a feedback loop coupled to the VCO, configured to adapt the VCO to provide a fast hopping signal.
21. (Withdrawn) A frequency synthesizer as recited in Claim 17 further comprising a feedback loop coupled to the VCO, configured to adapt the VCO to provide a fast hopping signal;
wherein the feedback loop comprises a frequency detector configured to provide a feedback to the VCO controller.
22. (Withdrawn) A frequency synthesizer as recited in Claim 17 further comprising a feedback loop coupled to the VCO, configured to adapt the VCO to provide a fast hopping signal;
wherein the feedback loop comprises a frequency detector configured to provide a feedback to the VCO controller, and the frequency detector detects a difference between a divided output and a divided reference frequency.
23. (Withdrawn) A frequency synthesizer as recited in Claim 17 wherein the VCO controller comprises a digital to analog converter configured to control the VCO input.

24. (Withdrawn) A frequency synthesizer as recited in Claim 17 wherein the VCO controller comprises a switch cap digital to analog converter configured to control the voltage controlled oscillator input.
25. (Original) A method for synthesizing a fast-hopping signal, comprising:
- generating a fixed frequency signal;
 - generating a variable frequency signal; and
 - combining the fixed frequency signal and the variable frequency signal to provide the fast-hopping signal.
26. (Withdrawn) A method for synthesizing a fast-hopping signal, comprising:
- providing a first voltage controlled oscillator (VCO) configuration to a VCO;
 - switching to a second VCO configuration at a fast-hopping switching speed; and
 - generating the fast-hopping signal.